

# Effect of bread shape and size on bread intake in children

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## Background

Many children do not eat enough foods containing whole grains like whole wheat, which can possibly have negative health consequences. Nudging may be a way to influence food choices by affecting unconscious behavioural processes. Two field studies were done at primary schools to examine whether or not the shape (study 1, van Kleef et al. 2014) and size (study 2) of bread rolls can increase whole wheat intake in children.

## Objective

To determine the effect of shape and unit size of bread rolls on bread intake, with the ultimate goal to increase intake of whole wheat in children.

## Methods

**Study 1:** between-subjects experiment conducted during breakfast at twelve primary schools. Children (n=1113) could freely choose between white and whole wheat bread rolls, varying in shape (regular versus fun) and consume ad libitum. Ad libitum consumption was measured at class level. Data analysis was done using ANOVAs with average number of whole-wheat bread rolls per child as dependent variable.

**Study 2:** within-subject cross-over design. Children (n=81) from 3 groups at one school (mean age 11.6, SD=0.5; 42 girls) lunched four times ad libitum at school with white and whole wheat bread rolls (small (30g) vs large (60g)), toppings (1-portion packages) and drinks. Consumption was measured at individual level. Data analysis was done with linear mixed models with treatment as fixed effect and groups and individual participants as random effects.

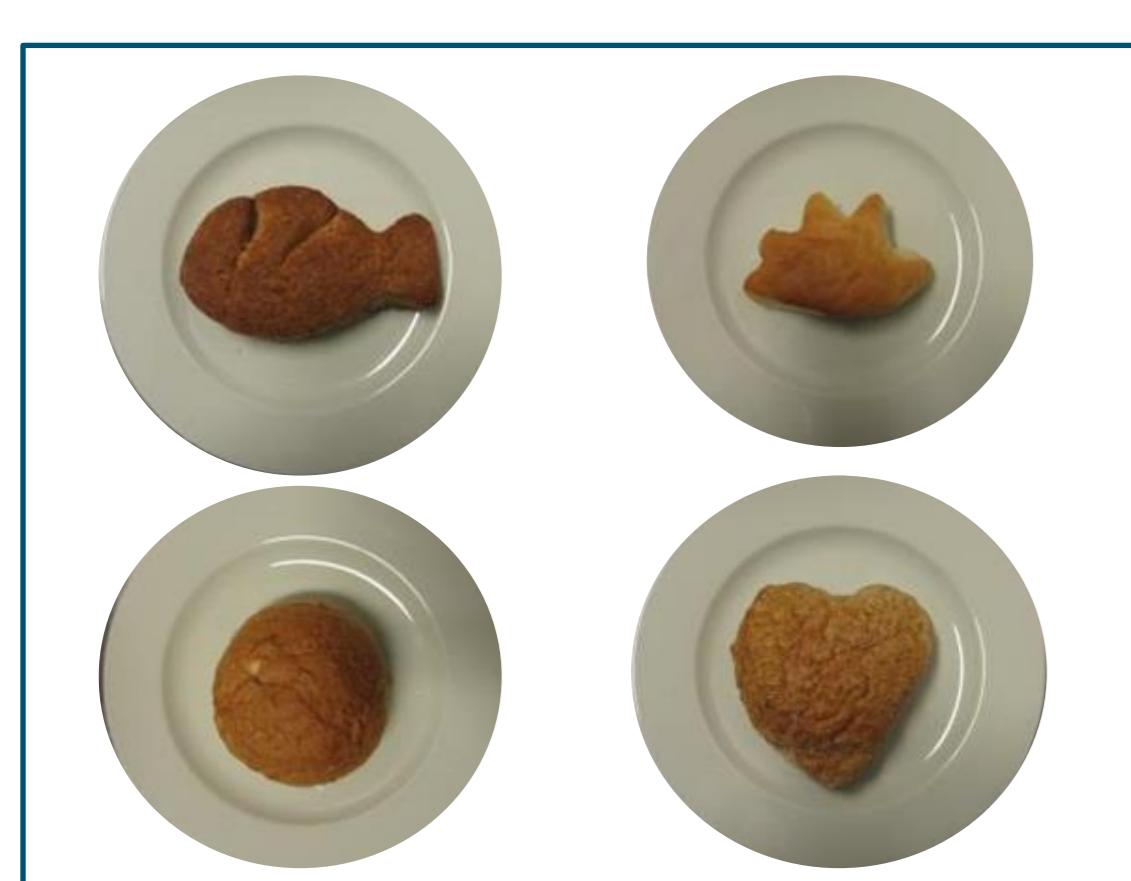


Figure 1. Examples of the bread rolls of study 1 (left) and study 2 (right)

## Results

### Bread choice - study 1

- The average number of consumed bread rolls was 2.9 (SD=0.8).
- 76% of total bread roll consumption was white.
- Consumption of white bread rolls did not differ according to shape
- When fun-shaped whole wheat bread rolls were presented alongside regular shaped white bread rolls, the consumption of whole wheat bread almost doubled ( $P=0.001$ ). *Figure 2*

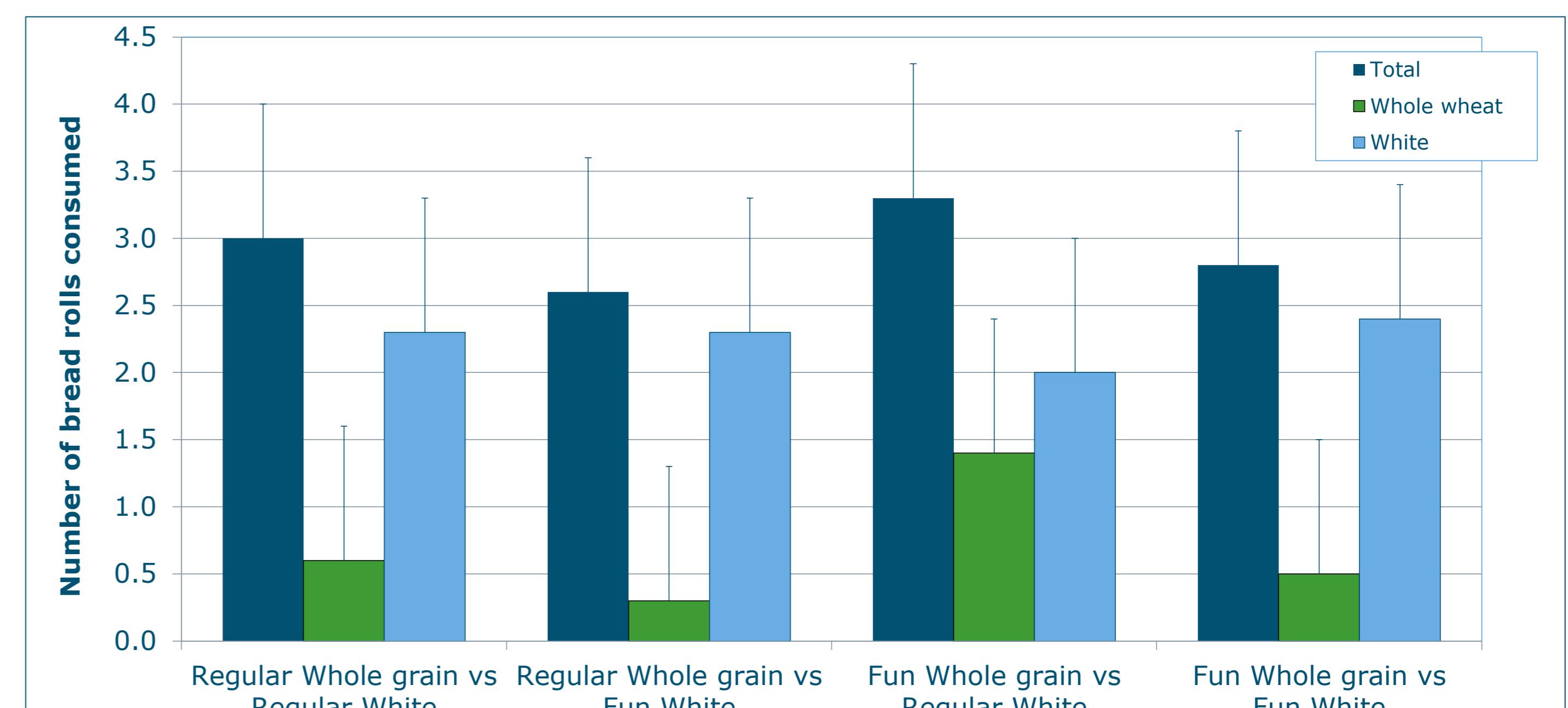


Figure 2. Bread roll intake from the different breakfast conditions (mean, SD)

### Bread choice and energy intake - study 2

- The average number of consumed bread rolls was 4.2 (SD=1.9).
- White bread rolls were favourite:
  - first chosen bread roll was usually white (89%) regardless of roll size
  - 81% of total bread consumption was white.
- Size did not affect the amount consumed of whole wheat rolls, whereas children consumed significantly more (ca 30 grams) of the larger white rolls than of the smaller white rolls ( $P<0.001$ ).
- On average, children consumed 660 (SD=258) calories during lunch, which was not affected by unit size of bread rolls. *Figure 3*
- The energy intake results imply that the additional energy from the larger-sized white role was compensated by lower energy from toppings ( $P<0.001$ ).

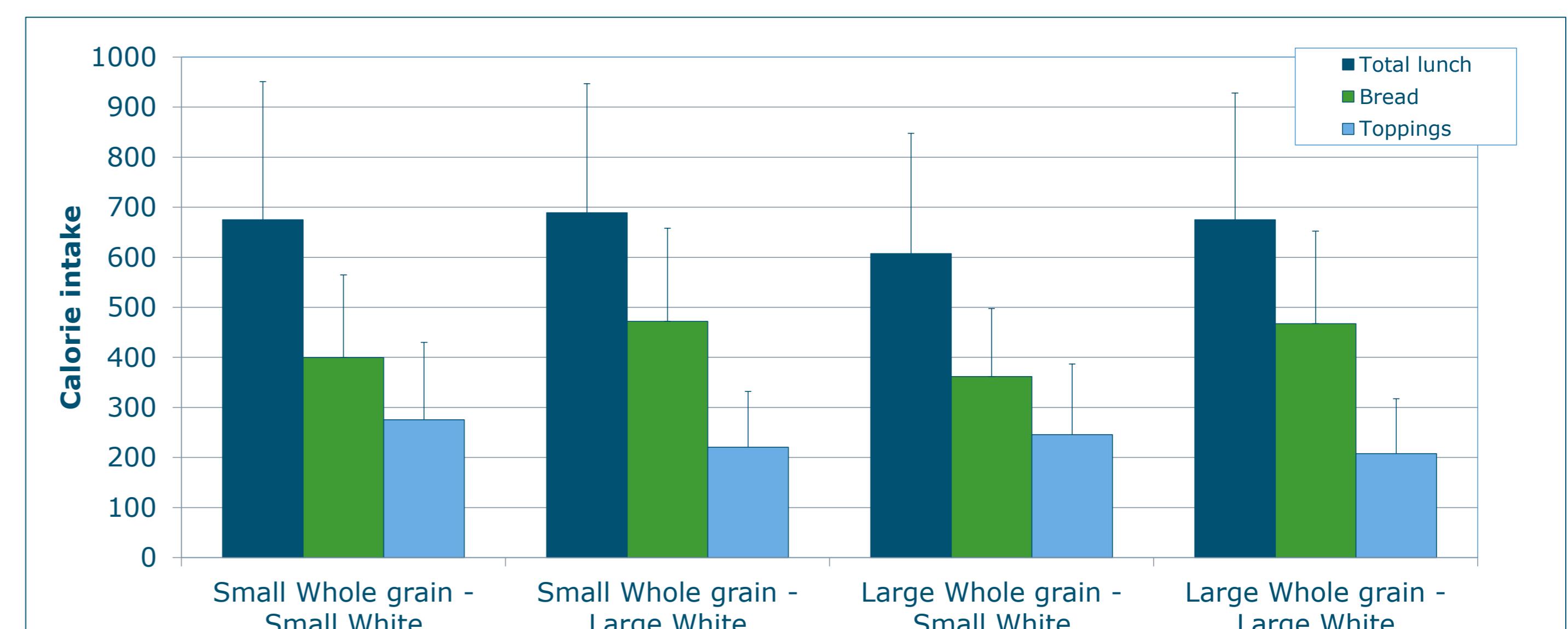


Figure 3. Energy intake (in calories) from the different lunches (mean, SD)

## Conclusions

Overall, presenting whole wheat bread in fun shapes, may be helpful in increasing consumption of whole wheat bread in children. In contrast, increasing or reducing the size of the whole wheat bread rolls did not trigger a higher whole wheat bread consumption.

## References

Van Kleef, E.; Vrijhof, M.N.; Polet, I.A.; Vingerhoeds, M.H.; Wijk, R.A. de (2014) Nudging children towards whole wheat bread: a field experiment on the influence of fun bread roll shape on breakfast consumption. *BMC Public Health* 14:906

## Acknowledgements

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